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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,821	12/27/2001	Jinn-Fa Wu	ASI 109	9861

7590 04/20/2004

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EXAMINER

COMPTON, ERIC B

ART UNIT	PAPER NUMBER
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3726

DATE MAILED: 04/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,821	WU ET AL.	
	Examiner	Art Unit	
	Eric B. Compton	3726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5 is/are allowed.
- 6) ☒ Claim(s) 6, 8 and 9 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 6 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. 4,717,977 to Brown.

Regarding claim 6, Brown discloses an apparatus for automatically dynamically adjusting prestressed bearings (col. 5, lines 32-38 discussing preloading bearings) of a shaft (44) comprising:

A sleeve assembly (34, 48) sandwiched between the bearings (66, 68) and including an outer sleeve (48) and a first inner sleeve (34) fitted together wherein a first thermal expansion coefficient of the outer sleeve is larger than that of the first inner sleeve (col. 2, lines 64-69, discussing differences of thermal expansion of the members 34, 48), an inner diameter of the outer sleeve is smaller than an outer diameter of the first inner sleeve (col. 4, line 59-60, discussing interference fit between the members 34, 48), and the outer and the first inner sleeves are secured together at an elevated temperature and cooled for compressing the first inner sleeve to extend axially by the outer sleeve (col. 4, lines 55-68, discussing a thermal heat shrink fit).

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Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown in view of U.S. Pat. 3,561,829 to Heldt.

Brown discloses the invention cited above. Specifically, that the inner sleeve is steel and the outer member is aluminum. It is noted that the coefficient of thermal expansion of aluminum is greater than that of steel. Col. 1, lines 49-54.

However, Brown does not disclose the particular materials claimed, i.e., that the outer sleeve is brass and the inner sleeve is Invar alloy.

Heldt discloses a sleeve assembly (12-14) mounted onto a shaft and bearings are then sandwiched between the bearings (6) as shown in Figure 4. The sleeve assembly relies on a wedge system to compensate for thermal expansion, wherein the outer wedges (10, 12, 13) have a greater coefficient of thermal expansion than the inner wedge member (9, 14). See col. 2, lines 34-39. The outer sleeve may be brass and the inner sleeve may be Invar alloy. Col. 2, lines 27-31.

Regarding claims 8-9, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the bearing apparatus of Brown, wherein the outer member is brass and the inner member is Invar alloy, in light of the teachings of Heldt, so that "the bearing will be adjusted in a manner that a

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detrimental pressure in the bearing is avoided." See Col. 2, lines 42-43; See also *In re Leshin*, 125 USPQ 416 (CCPA 1960) (holding that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice).

Allowable Subject Matter

5. Claims 1-5 are allowed.
6. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 1-5, the prior art of record does not teach or suggest a method of prestressing bearings of shaft comprising: providing an outer and inner sleeve; wherein the outer sleeve has a coefficient of thermal expansion greater than the inner sleeve and an inner diameter smaller than the outer diameter of the inner sleeve; shrink-fitting the outer sleeve over the inner sleeve; and mounting the sleeve assembly onto a shaft prior to sandwiching the sleeve assembly between the bearings, in combination with the other claimed subject matter.

Regarding claim 7, the prior art of record does not teach or suggest an apparatus having an outer and first and second sleeves, connect by a shrink fit and having

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decreasing coefficients of thermal expansion, in combination with the other claimed subject matter.

In U.S. Pat. 4,717,977 to Brown, although the sleeve assembly (34, 48) is shrink fitted together like Applicant's sleeve assembly, it is not mounted onto the shaft prior to sandwiching the sleeve assembly between the bearings. In contrast, the bearings are first mounted to the sleeve assembly and the shaft is then pressed onto the bearing; thus the sleeve assembly is not mounted onto the shaft. There is no suggestion to mount the sleeve assembly on the shaft, due to the presence on the stator coil.

In U.S. Pat. 3,561,829 to Heldt, a sleeve assembly (12-14) is mounted onto a shaft and bearings are then sandwiched between the bearing as shown in Figure 4. The sleeve assembly relies on a wedge system to compensate for thermal expansion, wherein the outer wedges (12, 13) have a greater coefficient of thermal expansion than the inner wedge member (14). See col. 2, lines 34-39. However, Heldt does not teach or suggest that an outer sleeve member, having an inner diameter smaller than the outer diameter of an inner sleeve member, is shrink fitted over the inner member.

In U.S. Pat. 6,599,022 to Obara, a sleeve (4) is press-fit over the outer bearing race (2). In contrast to Applicant's invention, the sleeve has a coefficient of thermal expansion less than the race.

In U.S. Pat 6,398,418 to Chang et al, the outer sleeve and inner sleeve are not in contact.

Response to Arguments

8. Applicant's arguments filed March 4, 2004, have been fully considered but they are not persuasive.

With regards to Brown, Applicant argues that the reference does not disclose "a sleeve assembly sandwiched between the bearings including an outer sleeve and first inner sleeve fitted together." However, this is not the case. Brown discloses a sleeve assembly (34, 38) including an outer sleeve (48) and inner sleeve (34) fitted together. Like Applicant, the inner sleeve is the portion of the assembly sandwiched between the bearings, but the outer sleeve is not. See Figure 2 of Applicant (showing only the inner sleeve sandwiched between the bearings). The outer sleeve, in both Brown and Applicant's invention, is in contact with rotating element. Therefore, Brown meets the above limitation in as much as Applicant does.

Applicant further argues that Brown does not teach "using an outer sleeve with a high coefficient of expansion to cause axial extension in an inner sleeve with a low coefficient of expansion." Applicant discloses this alternative mode of operation on page 5, lines 14-20 of the Specification ("It is appreciated by those skilled in the art that it is possible of mounting a second inner sleeve within the inner sleeve 23 for increasing an axial extension of the inner sleeve.") As noted, this mode is associated with a second inner sleeve. This is precisely why the Examiner indicated claim 7 as allowable subject matter, since it claims the second inner sleeve. However, Applicant's basic invention is essentially the same as Brown.

Temperature of bearings 11 and 12 and sleeve assembly 21 increase as rotating speed of shaft 10 increases. Hence, generated heat is transferred to outer

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sleeve 22 and inner sleeve 23. Inner diameter of outer sleeve 22 will expand to be larger than outer diameter of inner sleeve 23 when outer sleeve 22 is subject to heat. ***This may reduce pressure exerted on inner sleeve 23, resulting in a reduction of the axial extension (FIG. 3B). At the same time, prestress of bearings 11 and 12 is reduced accordingly.*** Temperature of bearings 11 and 12 and sleeve assembly 21 decrease as rotating speed of shaft 10 decreases. As a result, outer sleeve 22 and inner sleeve 23 return to tightly fitted state as that in room temperature. ***At this state, normal prestress is exerted on each of bearings 11 and 12.***

Specification, page 5, lines 3-13 (emphasis added). Thus, Applicant's invention seeks to maintain the proper preload of the bearings, by isolating or reducing the forces due to the temperature gradient as well. Brown, as pointed out by Applicant discloses "Incidentally, the bearings 66 and 68 are ***normally designed to operate with a certain level of pre-loading, and the isolation of the bearings from the differential forces which could otherwise arise from the large thermal coefficient of expansion of aluminum***, is a collateral advantage of the present invention." Col. 5, lines 32-38 (emphasis added).

Therefore, the prior art rejections are maintained.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

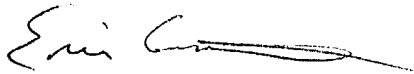
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (703) 305-0240. The examiner can normally be reached on M-F, 9-5.

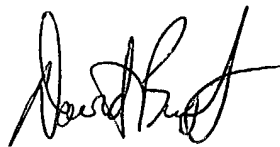
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter B. Vo can be reached on (703) 308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Eric Compton
Patent Examiner
A/U 3726



DAVID P. BRYANT
PRIMARY EXAMINER